APPETITE AND NUTRITION

PHAR-432

LECTURE: 5

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Hormones in appetite regulation

Leptin

- Leptin **reduce appetite** and decrease food consumption.
- Secreted by adipocytes
- **Low leptin** means a slower metabolism and drive to **increase food consumption.**
- Administering leptin analogs in humans is ineffective for appetite suppression.
- Leptin exists to prevent starvation, not to lose weight. Only when leptin is provided along with amylin, slight fat loss may occur.

Insulin

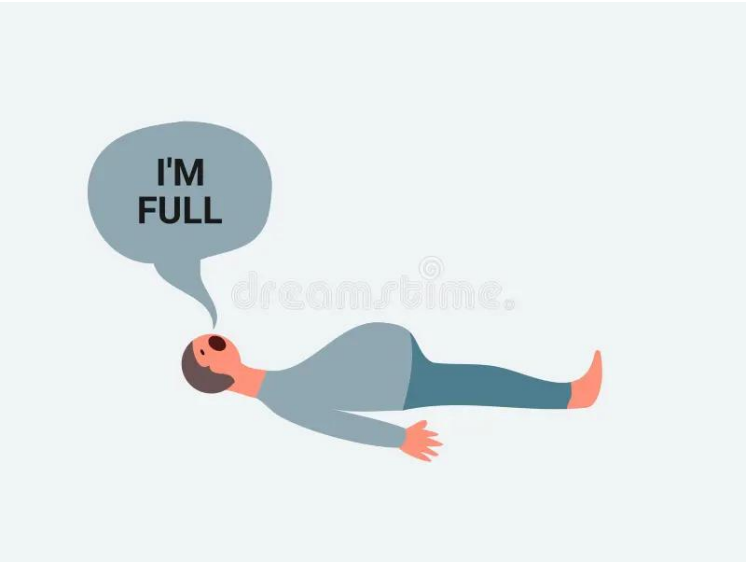
- Hormone secreted by pancreas in response to rise in glucose concentration
- insulin in the brain reduces food intake

Glucagon-like peptide-1 (GLP-1)

- Released when blood glucose levels are above the normal
- Secreted by cells of the gut in proportion to the amount of energy ingested
- Stimulates insulin and amylin secretion, assist in signaling the brain to stop eating, slow gastric emptying.

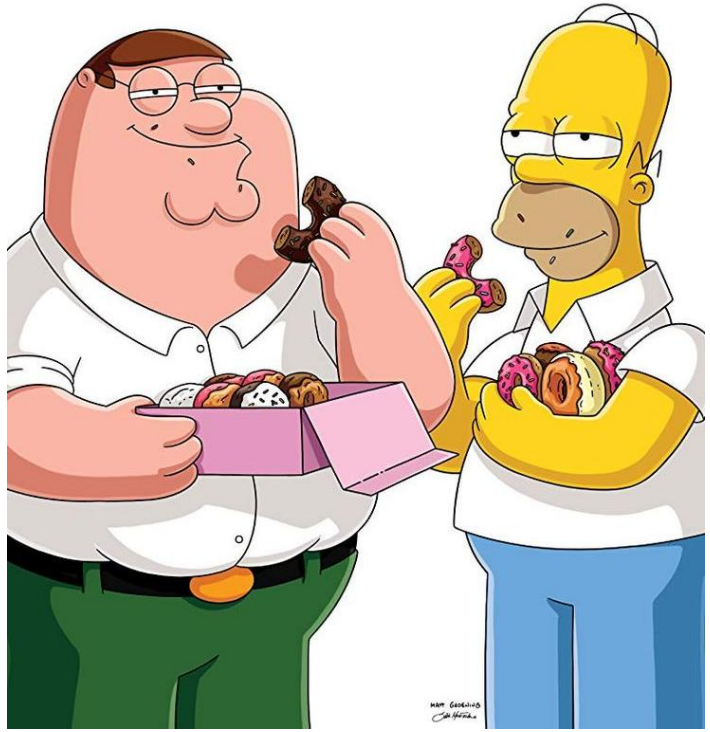
PYY3-36

- Produced by small and large intestines
- **Suppress appetite** and **inhibits stomach motility** while **increasing water and electrolyte absorption in the colon**.
- At lowest level before meal (fasting state), Rises during meals and signals satiety.
- It is an important **mealtime terminator**
- In **Obesity**, The **post-meal** rise in **PYY 3-36** is reduced
- After procedures like **Gastric bypass surgery,** PYY 3-36 levels after meals become **exaggerated**



Ghrelin

- **Ghrelin** Secreted by A-cells of
- gastric fundus.
- Referred as **Hunger hormone**
- Increase in gastric motility
- Stimulates release of growth hormone to encourage eating and acts to regulate energy balance, and increase fat storage.
- Hormonal clock



Why ill people eat less?

Systemic inflammatory mediators, such as tumor necrosis factor-alpha (TNFα), interleukins 1 and 6 and corticotropin-releasing hormone (CRH) influence appetite negatively

Processes from other cerebral loci, such as from the limbic system and the cerebral cortex, project on the hypothalamus and modify appetite. This explains why in clinical depression and stress, energy intake can change quite drastically.

How to control your appetite?

Nutrients and hormones to control appetite

- **Zinc:**

Leptin levels decrease in response to zinc depletion and increases after zinc supplementation. Adequate zinc levels reduce appetite, by increasing brain sensitivity to leptin.

- **Probiotics:**

Prebiotic treatment, increases gut microbiota fermentation, decreases appetite, and improves postprandial glucose responses.

Plasma levels of GLP-1 and PYY is increased in subjects following prebiotic treatment.

Nutrients and hormones to control appetite

- **Estrogen**

Main effect: **Decreases appetite**

Deficiency might result in a higher energy intake and increased body weight.

- **Testosterone**

Main effect: **Increases appetite**

Have little effect on food intake, although many people supplementing anabolic doses of testosterone (e.g. bodybuilders) do report increased appetite.

The dopaminergic system is also integral to reward- induced feeding behavior which is triggered by sugars.

Nutrients and hormones to control appetite

- **Serotonin**
- **Serotonin** (5-HT) is a short-acting widespread neurotransmitter which acts on a number of receptor subtypes found at high density in the limbic system as well as in the hypothalamus.
- 5-HT stimulates noradrenaline release and modifies behaviour and mood.
- 5-HT shows the most consistent inhibition of food intake. Serotonin may directly influence the melanocortin pathway.

Nutrients and hormones to control appetite

- A balanced intake of omega-6:omega-3 fats can help with appetite regulation.
- A high protein diet can reduce appetite.
- Fiber, help control appetite.
- Refined carbohydrates increases appetite.
- Dietary fat has mixed results; when combined with refined carbohydrate it increases appetite while on its own or combined with protein, it decreases appetite

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